



COMMISSION INTERNATIONALE DE L CLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

DIVISION 2 : PHYSICAL MEASUREMENT OF LIGHT AND RADIATION

Home Page: <http://physics.nist.gov/cie2>

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DIVISION 2 2000 ACTIVITY REPORT

April 30, 2001

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Division Officers

Director: Miss Teresa Goodman
Associate directors: Dr. Georg Sauter
Mr. Nobert Johnson
Mr. Guy Vandermeersch
Editor Mr. John Moore
Secretary Dr. Yoshi Ohno

Country Members (35 countries)

Argentina	L. Cogno	Japan	I. Saito*
Australia	J. Gardner	Netherlands	A. Bouman
Austria	M. Matus	New Zealand	J. Clare
Belgium	G. Vandermeersch	Norway	B. Brekke
Brazil	G. Moscati	Poland	J. Pietrzykowski
Bulgaria	V. Konstantinova	Romania	M. Simionescu
Canada	J. Zwinkels	Russia	R. Stolyarevskaya
China	G. Ye	Slovak Republic	J. Krempasky
Croatia	M. Zeljko	Slovenia	S. Erste
Denmark	L. Larsen	South Africa	F. Hengstberger
Finland	T. Timonen	Spain	A. Corrons
France	J. Bastie	Sweden	A. Ottosson
Germany	G. Sauter	Switzerland	P. Blaser
Great Britain	T. Goodman	Thailand	S. Vatanawong*
Hong Kong	T. Chung*	Turkey	L. Öztürk
Hungary	G. Dézsi	USA	N. Johnson
India	B. Bhattacharya	Yugoslavia*	P. Vukadin
Italy	M. L. Rastello		

* Yugoslavia is a new country member.

* Country representatives of Japan, Thailand, and Hong Kong changed since the last Activity Report.

Current Technical Committees

	Technical Committee	AD	Chair
	TC2-04 Secondary standard sources	S	John Moore
	TC2-16 Characterization of the performance of tristimulus colorimeters	S	Maria Luisa Rastello
	TC2-17 Recommendation for integrated irradiance and spectral distribution of simulated solar radiation	J	Dieter Kockott
	TC2-19 Measurement of the Spectral Coefficient of Retroreflection	J	Norbert Johnson
	TC2-23 Photometry of Street-Lighting Luminaires	V	Guy Vandermeersch
	TC2-24 Users guide for the selection of illuminance and luminance meters	V	K. Ganesha
	TC2-25 Calibration Methods and Photoluminescent Standard for Total Radiance Factor Measurement	J	Joanne Zwinkels
	TC2-28 Methods of characterizing spectrophotometers	J	Peter Clarke
	TC2-29 Measurement of detector linearity	S	Teresa Goodman
	TC2-30 Array radiometry	J	James Palmer
	TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings	J	Neil Hodson
Std	TC2-35 CIE Standard for $V(\lambda)$ and $V(\lambda)$	J	Klaus Mielenz
	TC2-36 Retroreflection: Definition and Measurement (Revision of CIE Publication 54, Liaison with CEN/226)	J	Justin Rennilson
	TC2-37 Photometry Using Detectors as Transfer Standards	S	Yoshi Ohno
	TC2-39 Geometric Tolerances for Colorimetry	J	Danny Rich
Std	TC2-40 Characterizing the Performance of Illuminance and Luminance Meters	S	Reiner Rattunde
	TC2-42 The Colorimetry of Visual Displays	J	Christine Wall
	TC2-43 Determination of measurement uncertainties in photometry	S	Georg Sauter
	TC2-44 Vocabulary Matters	J	John Moore
	TC2-45 Measurement of LEDs - Revision of CIE 127	S	Kathleen Muray
Std	TC2-46 CIE/ISO standards on LED intensity measurements	S	John Scarangelo
	TC2-47 Characterization and Calibration Methods of UV Radiometers	S	Gan Xu
	TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers	S	George Eppeldauer
	TC2-49 Photometry of Flashing Light	V	Yoshi Ohno
	TC2-50 Measurement of the optical properties of LED clusters and arrays	V	Georg Sauter
	TC2-51 Calibration of diode-array spectrometers	J	Richard Austin
NEW	TC2-52 Photometry of Emergency Lighting Luminaires	V	Guy Vandermeersch

Std: TCs producing ISO/CIE standards

Reporterships

Reporter Title	AD	Reporter
R2-05 Visual Gloss	J	Julie Taylor
R2-06 Standardization of Measuring Geometry for the Colorimetry of Metallic Coatings	J	Calvin McCamy
R2-18 OIML Matters	S	Georg Sauter
R2-21 Use of detectors as absolute transfer standards for spectroradiometry	S	Nigel Fox
R2-23 ISO/CIE Standards for the measurement of reflectance and transmittance	J	Danny Rich
R2-24 Classification of color measuring instruments	J	Yoshi Ohno
R2-25 Liaison with IALA	V	Ian Tutt

Liaisons

Organization	Liaison Officer
CCPR - Consultative Committee of Photometry and Radiometry	Rainer K hler
ISO TC6 Paper, board & pulps	Joanne Zwinkels
ISO TC 180/SC 1: Solar energy/Climate - Measurement and data	Dieter Kockott
IEC TC 34: Lamps and rel. equipment	Guy Vandermeersch
IEC TC100/PT61966 Audio, Video and Multimedia Systems and Equipment	Yoshi Ohno
IEC/ISO JTAG2: Joint Technical Advisory Group 2	Alan Robertson
Division 8	Yoshi Ohno

Closed functions

R2-19 Emergency Lighting Luminaires
R2-22 Implementation of SI Photometric Units

New functions established

TC2-52 Photometry of Emergency Lighting Luminaires

MEETINGS

1. 2000 Division 2 Meeting (8 April)

2000 Division 2 Meeting was held on April 8, at NPL, Teddington, UK, with 37 attendees from 14 countries including 13 country members. The minutes of the meeting were compiled by the Secretary and distributed in October 2000, which is attached in this Activity Report.

2. Div.1/Div.2 Joint meeting (6 April)

A joint meeting of Division 1 and Division 2 was held on April 6, at NPL, Teddington. The meeting lasted for two and half hours, with 68 attendees. We had short reports from D1 Director Sagawa and D2 Director Goodman, and then from TC1-37 (Supplementary System of Photometry), 1-46 (equivalent luminance), 1-48 (Revision of CIE 15.2), 2-39 (Geometric Tolerances for Colorimetry), 2-49 (flashing lights), and TC2-16/28/42 (colorimetry-related TCs). There were brief discussions on each of these TCs and many good comments were exchanged between the two Divisions. The minutes of the meeting is attached in this Activity Report.

3. 2000 Technical Committee Meetings (6-8 April)

The following ten TCs met on 6-8 April, 2000 at NPL, Teddington. Brief reports on these TC meetings are included in the Division 2 Meeting minutes attached.

TC2-16 (Rastello) - 5th draft discussed.

TC2-36 (Rennilson) - Results of Division ballot were discussed for final (15th) draft.

TC2-39 (Rich) - Action items from last meeting were discussed for their second draft.

TC2-42 (Hanson) - First draft discussed.

TC2-43 (Sauter) - 3rd draft discussed.

TC2-45 (Muray) - 2nd partial draft discussed.

TC2-46 (Scarangelo/Jones) - 3rd draft discussed.

TC2-48 (Eppeldauer) - 2nd draft discussed.

TC2-49 (Ohno) - 2nd partial draft discussed.

Ad-hoc meeting on photometry of white LEDs (Ohno) - presentation by K. Kohmoto.

Ad-hoc meeting on photometry of emergency luminaires (Vandermeersch)

4. Expert Symposium on Uncertainty Evaluation (Jan. 22-24, 2001)

This Symposium was planned and organized by Division 2 to address the increasing need for evaluation of uncertainty of measurements. The meeting was held on Jan 22-24, 2001 at CIE Central Bureau, in conjunction with EUROMET Contact Persons meeting. The symposium consisted of one day tutorial and one-and-half day workshop. The meeting was successful with about 60 participants, totally crammed in the meeting room at the Central Bureau. We had four lectures (dominant part by Georg Sauter – TC2-43 Chair) and 13 technical paper presentations. The meeting was mainly organized by Director Goodman with collaboration of Associate Director Sauter, Secretary Ohno, and CIE CB.



Minutes of CIE Div.1/Div.2 Joint Meeting

9:30 - 12:00, 6 April, 2000

NPL, Teddington, UK

Y Ohno and Y Nakano, April 2001

Agenda

1. Brief reports on D1 and D2 activities (K Sagawa and T Goodman)
2. D1 and D2 related TC reports
 - TC1-37 Supplementary System of Photometry (K Sagawa)
 - TC1-46 Concept and Application of Equivalent Luminance (Y Nakano)
 - TC2-39 Geometric Tolerances for Colorimetry (D. Rich)
 - TC1-48 Revision of CIE Document 15.2 Colorimetry (J Schanda)
 - Other Colorimetry related D2 TCs (TC2-16, 2-28, 2-42)
 - TC2-49 Photometry of Flashing Light (Y Ohno)

Attendance: 68 attendees from Divisions 1 and 2. The attendance list is kept by Secretary.

1. Call to order

Teresa Goodman, D2 Director, opened the meeting and welcomed everybody present, mentioning that this year was the centennial of NPL, which was founded in 1900. D1 and D2 have many common issues but have not had a joint meeting for a long time. Ken Sagawa, D1 Director, also welcomed everybody and thanked T. Goodman for organizing the meetings. Sagawa reported some sad news, the recent death of John Verrill, who worked at NPL for a long time and contributed greatly to both D1 and D2. He wished to have a joint meeting at NPL. Sagawa also reported the death of Leo Mori of Japan who was an expert in color rendering and active in CIE. The participants joined to observe a moment of silence for the two scientists.

2. Report from Division 1 (K. Sagawa)

Div. 1 currently has two sections; 1) Vision and 2) Color. The Vision section deals with luminous efficiency and photometry, acuity, visual performance, etc. The Color section deals with all topics related to color and colorimetry. The former section of Visual ergonomics was included in Vision section two years ago. In each section, there are 11 to 12 TCs and 7 to 8 reporterships. The two main items which are currently investigated in the Vision section are:

- 1) supplementary systems of photometry (TC1-21 and 37) - developing new photometric system based on brightness at any level, including mesopic vision, and

2) a physiologically-based colorimetric system, trying to establish more reliable cone fundamentals and chromaticity diagrams.

In the Color section, there are 4 main subjects:

1) color order system. The job was almost finished in TC1-31. ISO asked CIE to recommend one color order system as a standard. D1 investigated the possibility, but after a long discussion, the Munsell system and NCS system were both found useful in different application fields and therefore both are recommended.

2) Color appearance model, dealt by TC1-34 and TC1-27. CIECAM97s was published in 1997 and is being widely used in imaging and lighting applications.

3) Color difference evaluation, handled by TC1-47 and 1-55. Now investigating dependence on chroma, hue, and lightness, to establish a new formula.

4) color rendering. TC1-33 investigated whether to establish a new index for color rendering, but it proved difficult to get TC approval. The TC will continue to investigate it in some other form.

<Discussion>

Moore asked in which direction TC1-33 (color rendering) would be going. Sagawa answered that this subject is related to color appearance and color difference. So they may wait and incorporate these outcomes.

2. Report from Division 2 (T. Goodman)

D2 is responsible for the measurement of light and optical radiation. Activities are divided into 3 groups, each of which is assigned to an AD; materials aspects (N. Johnson), sources and detectors (G. Sauter), and luminaries (G Vandermeersch). Currently Div.2 has 26 TCs. There is much work going on in D2 related to LEDs. This reflects the fact that LEDs are becoming more and more widely used, particularly with the development of white LEDs. Some of the uses of LEDs relate to both D1 and D2. There are three TCs working on LEDs, TC2-45, 46, and 50, standardizing measurement methods for luminous intensity, luminous flux, and color. TC2-50 will work on the measurement of LED clusters and arrays. Another TC of wide interest is TC2-43, uncertainty in photometry. D2 is planning a CIE workshop on uncertainty evaluation. Another area of mutual interest is the publication of ISO/CIE standards on $V(\lambda)$ and $V(\lambda)$. TC2-35 will publish these functions as standards. Use of array-type spectroradiometers is becoming more and more common. TC2-51 is a new TC to prepare a practical guide for calibration of detector array instruments.

3. TC Reports related to D1 and D2

TC1-37 Supplementary System of Photometry (K Sagawa)

This TC is developing a new system of photometry based on brightness at any levels. Under the current system based on $V(\lambda)$, luminance does not correlate well with the sensation of brightness. One reason is a chromatic effect (Helmholtz-Kohlrausch effect), the other is the Purkinje effect. Saturated colors look brighter because of the Helmholtz-Kohlrausch effect. The unit of the system is equivalent luminance (brightness match to 555 nm). Several proposals are being considered for a 2 degree system that deals with the Helmholtz-Kohlrausch effect, and a 10 deg system that deals with the Purkinje effect. Recently the technical report has been finished and it is now at Division ballot. TC1-21 was responsible for testing, and its job has been finished.

<Discussion>

Ohno asked whether this can be applied to conspicuity of LEDs —for signaling applications. Sagawa answered that brightness is closely related to conspicuity and some other visual functions. The TC should probably show how to use this system. Trezona mentioned that it is premature to decide the system. Sagawa added that D1 is interested in conspicuity or detectability aspects of vision for roadway lighting applications.

TC 1-46 Concept and Application of Equivalent Luminance (Y Nakano)

This TC was started in 1995 with Kokoschka as the chairman, but he could not continue and Nakano succeeded him in 1997. The ToR are to write a report describing the fundamental concept of equivalent luminance and to provide guidance on how to apply these concepts. The TC recently finished the first draft. Equivalent luminance is the luminance of 555 nm radiation that the brightness sensation of a given stimulus.

TC2-39 Geometric Tolerances for Colorimetry (D Rich)

This TC was originated from D1 by John Verrill, to update specifications of geometry in Pub. 15.2, and to write a technical report on geometric tolerances in colorimetry, including 0/45, 0/d and others. The working program is to utilize geometric information from ISO 5/1 and ASTM E1767 to develop a system of specifications. Reflectance factor (t/8, d/8, d/0), radiance factor (45/0) and transmittance geometries (0/0, d/0) are included. Current TC members include major manufacturers of spectrophotometers. Literature including CIE 15.2, JIS Z 8722, ISO/CD 7724/1, ASTM 1164, ISO 5/4 were reviewed and investigated. McCamy's paper Concepts, Terminology, and Notation for Optical Modulation was also studied. The TC has come up with preliminary specifications of tolerances for each geometry. Presently working on the draft of final recommendations.

<Discussion>

McDowell commented. TC42 and TC130 (ISO) are jointly revising ISO 5. CIE is welcome to participate in these groups. Second, there is major discontinuity in the area of transmission measurements; densitometry is based on opal and colorimetry is based on integrating sphere. For practical purposes in many industrial labs today, colorimetry is based on opal because of the need to do these measurements at the same time. This causes differences of up to about 5 ΔE because of surface interreflections. This discontinuity needs to be addressed.

TC1-48 Revision of CIE Document 15.2 Colorimetry (J Schanda)

This TC was established in 1997 to revise CIE 15.2. The TC has 17 members. The contents of the revised document will include standard illuminants and sources, geometric conditions for colorimetry (details to go to TC2-39), standard colorimetric observers, tristimulus values and chromaticity coordinates, uniform color spaces including CIE 94, and miscellaneous colorimetric practices, with tables of functions. Appendix will include old definitions, CIE RGB system, and a short description of the CMC color difference formula. Points still under debate include data intervals of the tables —1 nm or 5 nm (in relation to TC1-38), terminology for geometry, and definition of correlated color temperature (to use u, v or u, v). The TC has now a 7th draft and is trying to finish the document.

<Discussion>

Luo commented. TC1-47 is working on a new color difference formula, which should be included in this new report. CIECAM97s should also be included. CIE 94 and CMC should be equally

mentioned. Schanda answered that this is a timing problem; we cannot wait too long for other committees to finish their work. Pointer agreed that CIE 15.3 should be published now. Ohno commented: CIE 1-38 is making recommendations on wavelength intervals and limits. This should be related very much to physical measurements in spectroradiometry and a good liaison with D2 should be maintained.

TC2-16 Characterization of the performance of tristimulus colorimeters (M L Rastello)

This TC is a long lasting one. Rastello took the chair before the New Delhi session. Since then 4 new drafts have been prepared. ToR are to produce a report recommending methods for assessing the performance of tristimulus colorimeter heads for measuring chromaticity coordinates of light sources. This does not include colorimetry of materials. The document tries to provide an objective means for evaluating the properties of tristimulus colorimeters and a guide for manufacturers to develop improved instruments. A new proposal is coming from Yoshi Ohno, which may solve many problems. The TC planned to meet the following day.

TC2-28 Methods of characterizing spectrophotometers (Peter Clarke)

The TC was chaired by John Verrill but has now been taken over by Clarke. The TC's scope includes the use of calibrated materials for determining errors, and deals with instruments to measure spectral reflectance and transmittance (regular, diffuse, or mixed) in the wavelength range from 200 nm to 3000 nm. Working on 4th draft. The document is addressing linearity, wavelength error, stray light, bandwidth, integrating sphere error, geometry error, polarization, etc. The document will complement CIE 130.

TC2-42 Colorimetry of displays (Andrew Hanson)

The TC has been working for 5 years. Displays are complex, spatially, spectrally, and temporally, thus the need for this work. ToR are to produce a Technical Report summarizing recommended best practice for the measurement of the colorimetric and spectroradiometric properties of visual displays. The TC now has a large membership list. First draft has been written and to be discussed the following day. The Report includes different technologies of displays, technologies to measure colorimetric properties, problems in instruments, and recommended practice.

TC2-49 Photometry of flashing light (Yoshi Ohno)

The TC was established in 1998 and has just started work. More members are welcome. A workshop was held in Warsaw. The report was published in the CIE proceedings and on the D2 website. We need a guide in this area urgently. Since D1 has difficulty taking leadership in this work, a TC was established in D2 with a focus on physical measurement. It is not planned to go into details of visual perception but to refer to existing knowledge. Several different methods are now available for determining effective intensity: Blondel-Rey, Blondel-Rey-Douglass, and Schmidt-Clausen's Form Factor method. At the last TC meeting in Warsaw, it was agreed to use the Form Factor method in the document. EC regulation 65 already uses the Form Factor method. IALA documents also use the Form Factor method. ASTM are also developing standard documents for warning lights, and are considering the use of the Form Factor method. Draft 0.2 was to be discussed the following day. Sagawa mentioned that a lot of visual aspects need to be considered when determining the model. The chairman requested a lot of help from D1.

Closing

Teresa Goodman concluded that she felt it very valuable to have a joint meeting like this, and it should be continued in the future as well. She welcomed further exchange of comments across the two Divisions in the following TC meetings.

Schanda mentioned that CIE CB prepared all the D1 and D2 publications in PDF format to publish them in CD ROM. However, before they can be distributed, the contents must be verified by experts and this would be a lot of work. He asked for many volunteers to undertake this task to cover all the documents.

Adjourn



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October 15, 2000

Minutes of CIE Division 2 Meeting Saturday, April 8, 2000 NPL, Teddington, UK

Abbreviations:

AD:	Associate Director	NC:	National Committee
Brep.	Board of Administration Report	TC:	Technical Committee
CIECB:	CIE Central Bureau	TCC:	Technical Committee Chair
CIEBA:	CIE Board of Administration	TR:	Terms of Reference
CM:	Country Member	ST:	Status
D2:	Division 2 (D1, D4, D8, likewise)	WG:	Working Group
ML:	Member List		

Attendees:

Richard Austin	Gamma Scientific, USA (TC2-51)
Jean Bastie	BNM-INM/CNM, <u>France</u> (CIE Vice President)
<u>Anton Bouman</u>	Philips, <u>Netherlands</u>
<u>Joaquin Campos</u>	CSIC, <u>Spain</u>
Peter Clarke	NPL, UK (TC2-28)
Dennis Couzin	Avery Dennison, USA
George Eppeldauer	NIST, USA (TC2-48)
<u>Teresa Goodman</u>	NPL, <u>UK</u> (D2 Director)
Didier Halkin	Laborelec, Belgium
G nther Heidel	Osram Optosemiconductors, Germany
Andrew Hanson	NPL, UK (TC2-42)
Paola Iacomussi	IEN, Italy
<u>Norbert Johnson</u>	3M, <u>USA</u> (D2 AD)
Carolyn Jones	LumiLeds, USA
David King	PK Scientific, USA

Kohtaro Kohmoto	JELMA, Japan
Hans Allan L fberg	Unig. G vle, Sweden (CIE President)
Dave McDowell	Kodak, USA (D8 AD)
John Moore	UK (D2 Editor)
Kathleen Muray	INPHORA, USA (TC2-45)
Yoshi Ohno	NIST, USA (D2 Secretary)
<u>Allan Ottosson</u>	Univ. G vle, <u>Sweden</u>
<u>Jerzy Pietrzykowski</u>	GUM, <u>Poland</u>
<u>Maria Luisa Rastello</u>	IEN, <u>Italy</u> (TC2-16)
J. Rennilson	RCS, USA (TC2-36)
Danny Rich	Sun Chemical, USA (TC2-39)
<u>Terubumi Saito</u>	ETL, <u>Japan</u> (representing H. Onuki)
Victor Sapritsky	VNIIOFI, Russia
<u>Georg Sauter</u>	PTB, <u>Germany</u> (D2 AD)
Paolo Soardo	IEN, Italy
<u>Raissa Stolyarevskaya</u>	VNIIOFI, <u>Russia</u>
<u>Natasha van Tonder</u>	CSIR-NML, <u>South Africa</u> (representing F. Hengstberger)
Heinz Terstiege	Germany
Ian Tutt	Trinity House, UK
<u>Guy Vandermeersch</u>	Laborelec, <u>Belgium</u> (D2 AD)
Pierce Webb	Eastman Kodak-retired, USA
<u>Joanne Zwinkels</u>	NRC, <u>Canada</u> (TC2-25)

Total 37 persons from 14 countries, including 14 country members (representatives) attended. Underlines indicate country members.

Regrets received by Secretary

Carl Andersen (USA, IALA)	Ian Lewin (USA)
John Arens (USA)	Daniel Lozano (Argentina)
<u>Peter Blattner (Switzerland)</u>	<u>Michael Matus (Austria)</u>
<u>John Clare (New Zealand)</u>	Calvin McCamy (USA)
<u>Antonio Corrons (Spain)*</u>	Klaus Mielenz (USA, TC2-35)
<u>Stanko Erste (Slovenia)</u>	<u>Hideo Onuki (Japan)*</u>
Arnold Gaertner (Canada)	<u>Leyla zturk (Turkey)</u>
<u>Jim Gardner (Australia)</u>	Alan Robertson (Canada)
K. Ganesha (India, TC2-24)	John Scarangelo (USA, TC2-46)
<u>Franz Hengstberger (South Africa)*</u>	Gan Xu (Singapore, TC2-47)
Neil Hodson (USA, TC2-32)	Jeanne Marie Coutin (France)
Hiroaki Ikeda (Japan, IEC TC100/TA2)	Reiner Rattunde (Germany, TC2-40)
Rainer Kohler (BIPM)	

* Represented by other participant.

Underlines: country members.

Handouts

- 1) Agenda of the 2000 Division Meeting
- 2) List of Division 2 TCs, Reporterships, and Liaisons

1. Call to order

The Division Director, Teresa Goodman, opened the meeting at 10:45 am, and welcomed all present. The Director expressed her thanks to Secretary Y. Ohno for his hard work to prepare for this meeting and to keep Division 2 running actively throughout the year. The Director introduced Jay Rennilson who is the president of CIE-USA and the host of the CIE 25th Session in 2003 in San Diego. Rennilson thanked Goodman and National committee of UK for the hospitality for this meeting in Teddington, and expressed his wish to welcome many people to the 2003 Session in San Diego.

2. Approval of agenda

Agenda of this 2000 Division 2 meeting (Attachment 1) was approved with no changes.

3. Approval of the minutes of the 1999 Division meeting

The minutes of the last Division meeting in Warsaw (distributed by e-mail and mail in September 1999) was approved with no corrections. The attendees were in favor of the detailed version of the last meeting minutes.

4. Director s report (T. Goodman)

Director reported one of the important issues that came up at the Board meeting in Warsaw — a proposal for new membership categories. These do not replace existing membership but are additional ways that particular companies or new countries can become involved in CIE. The new categories are: 1) Associate national committee member —for new countries or geographic areas that have established a new national committee, no voting rights, 2) Associate members —for organizations or individuals in countries where there is no national committees or associate NCs, and 3) Supportive members —for international or regional organizations and companies. Supportive members must be already a supporter of the NC and their support in those countries must not be reduced. Supportive members split into 4 different levels: Basic, Silver, Gold, and Diamond. Different levels have extra bonuses, for example, Gold members have a right to have 3 pages space in CIE news, copies of CIE publications within the company, etc. The levels depend on the fees.

5. Secretary s report (Y. Ohno)

(1) Arrangement for London meeting

Secretary first thanked Goodman and other members of NPL for various arrangements for this meeting. It was a bit pity that we had a conflict with Euromet meeting in Turkey, due to which several people could not come. Their schedule came out later without our knowledge.

(2) Country members

Div.2 currently has 34 country members, the same as last year. Since last D2 meeting, we have some changes of the country representatives; Japan (Nishi to Onuki), Romania (Ionescu to Simionescu), Russia (Ignatyev to Stolyarevskaya), and Switzerland (Blaser to Blattner).

(3) Activity Reports

The minutes of the Warsaw meeting were issued and distributed in Sep. 1999. The draft minutes were first circulated by email in August. The 1999 Activity Report was also issued and distributed in Feb. 2000. Most of D2 circulars are now distributed via email only, with documents posted on the website. Any problems with electronic circulation of documents are to be reported to Secretary. Physical mails are used only for those who have no access to email and are limited to important circulars only. Fax modem is also used for fax recipients to send email circulars (text only).

(4) Division 2 Mailing List

The D2 mailing list now contains 138 persons (last year —129). Among them, 128 have e-mail addresses (93 % of all), 4 have access to fax and 6 rely on mail. The List includes 34 country members, 20 officers of CIE and Div.2, 29 TC chairs and reporters, 8 former TC chairs, 5 liaison persons from outside organizations, and 56 associates.

(5) Email reflector & virtual TC meeting

An email reflector for Div. 2 (cie-d2@nist.gov) was established in March and is already being used actively. The subscribers are all the persons on the D2 Mailing List and not open to others. This reflector is intended for use for free discussions the people on the D2 Mailing List as well as by Secretary (and other D2 Officers) for distributing circulars. Moderated discussion is also possible to reach decisions on urgent matters. The Secretary also plans to create email reflectors for all the D2 TCs to facilitate TC work. TC chairs are encouraged to use email reflectors to hold virtual TC meetings in between physical meetings or to follow up on the physical meetings that tend to be very short.

Vandermeersch suggested to make a procedure for holding a virtual TC meeting (agenda, start date, duration, advance announcement, etc.). Hanson stressed that it is very important to set (early) deadlines for responses in such virtual meetings. Answering questions, Secretary added that attachments can be used in these email reflectors (but long ones should be posted on the website to avoid long receiving time for modem users), and these reflectors can be set up at NIST shortly. Vandermeersch suggested to have minimum rules (email titles, format, etc.) for the email list (IEC, e.g., every comment is numbered and initials of the sender, and refer to the number for response to this.) Director commented that it is an excellent idea and encourage TC chairs to use this to get TC work going as quickly as possible.

(6) D2 Website

The D2 website has been maintained to keep information up-to-date. Some changes were made: 1) new background (also used for CIE main page that is being renovated by CIE BA). On the TC page; the status records for only past two years is posted to reduce the file size. Documents submitted from TC chairs (not TC draft) are posted on these TC pages (with no passwords).

Kohmoto commented that the managing system of D2 is working very well compared with D6; all CIE divisions should apply the same system. Ohno mentioned that it is already agreed among other Division Secretaries to use the D2 website as a model for Division website (Secretary meeting in Warsaw, 1999).

6. Editor s report (J. Moore)

(1) Editing documents

Since Warsaw, no TC reports have been submitted to Editor.

(2) Status of publications

The document from TC2-33, CIE Standard Illuminants for Colorimetry has been published as ISO10526-1999/CIE005-1998, which replaces previous ISO/CIE 10526. The other document, a CIE Standard - CIE System of Photometry from TC2-35 is under Division ballot, due by the end of May. The Technical Report —Pub. 54.2 Retroreflection: Definition and Measurement, from TC2-36 has finished Division ballot and is to be published. This document will replace Pub. 54-1982. (See TC2-36 report in later section) The Editor also put together a report to publish the data from now-closed TC2-22 (Luminous Flux of High-Pressure Sodium Lamps) in CIE Collection. The report includes data of partially completed intercomparison.

(3) Electronic ballot issue

The Editor has a concern on electronic balloting, which has been employed since the ballot for TC2-14 document (on measurement of reflectance and transmittance). At this ballot, we got 6 comments, and none of these were from countries that were active in the TC. The same thing has happened to the ballot for TC2-36 document. Some Division members say they never received notification in these two past votes. The Editor is not against electronic balloting but brings up a caution that system is not working and suggests that some measures be taken.

<Discussion>

Sauter commented that there should be a confirmation that the notification and document have been received so that any communication problems may be found. Goodman pointed out that these people are not sending ballot back partly because they were active in the TC and already happy with the document; another problem may be that the voting has a very long dead line, and people wait till the end and forget it. She suggested that a reminder be sent two weeks before closing. L fberg noted that long reply time (90 days) is necessary for national committees to collect comments, and agreed to have reminders for such a long deadline. Vandermeersch mentioned that voting should reflect the position of industry and government authority of that country, and national committee should also be alert. He suggests all the NCs also receive the voting information as well as Division members. Johnson suggested that reminders be sent 30 days and 60 days rather than two weeks. Ohno suggested that it might help if Division Secretary also receives the notification and circulate the information to Division Mailing List. Sauter suggested to post the information at CIE website. Moore suggested that TC chairperson should also receive a courtesy copy of the voting document since the page layout of the voted version often changes, which causes

confusion at later editing process; TC chairs should be kept informed at all stages until the document has been published.

<Consensus>

Goodman summarized and the attendees agreed that

- we request CB that, when the voting notification is sent to CMs, CB also notify to the NC Secretaries that vote is underway,
- ask CB to issue reminders at 30 and 60 days to those countries who have not responded,
- ask CB to send a request to CMs for immediate response for confirmation of receiving the notification and document.
- A courtesy copy of the voting document (and notification) should also be sent to the TC chairperson and Division Secretary and the news also be posted on the CIE website.

7. Progress report of Technical Committees

7.1 Technical Committees

Progress reports on the technical committees were given by Associate Directors. Vandermeersch reported TCs 2-23, 24, 49, 50, and reportership R2-19, 25. Johnson reported TCs 17, 19, 25, 28, 30, 32, 35, 36, 39, 42, 44, 51, and reporterships R2-5, 6, 23, 24, 25. Sauter reported TC2-04, 16, 29, 37, 40, 43, 45, 46, 47, 48, and reporterships R2-18, 21, 22. The reports of all the TCs are shown below in the numerical order of the TCs.

TC2-04 Secondary standard sources

Chair: J. Moore (UK) **AD:** Sauter

ML: Bandyopadhyay (India), Corrons (Spain), Gaertner (Canada), Jiang (China), Low (USA), Metzdorf (Germany), Nishi (Japan), Schanda (Hungary)

TR: Produce a technical report on the selection and operation of stable secondary standard sources.

ST: A draft Technical Report has been circulated to the members of the TC for ballot. Provided that no serious objections are received, it is intended that the Division and Board ballot should take place later this year and it should then be possible to publish a CIE Technical Report on the selection and operation of stable secondary standard sources next year. It has already been decided to limit the coverage of the report to tungsten filament lamps. Because of the special nature of the hand-made lamps recommended for use as stable secondary standards, the report will contain a complete list of all the known manufacturers of such lamps. With recent rapid developments in digital scanning procedures, it has been possible to include a number of photographic illustrations in the report. These are not in colour, but as far as the TCC is aware, it will be the first time that photographs have been published in a CIE Technical Report.

TC2-16 Characterization of the performance of tristimulus colorimeters

Chair: M. L. Rastello (Italy) **AD:** Sauter

ML: Denner (South Africa), Goodman (UK), Hengstberger (South Africa), Moore (UK), Muray (USA), Ohno (USA), Rattunde (Germany), Robertson (Canada), Sauter (Germany), Schanda (Hungary), Steindl (Austria), Terstiege (Germany)

TR: To produce a report recommending methods for assessing the performance of tristimulus colorimeter heads for measuring chromaticity coordinates.

ST: Report given by TCC. The TC had a meeting on April 7th. The 5th draft was discussed. There was not enough time to go through the document. We discussed a proposal by Ohno to evaluate spectral response properties by using CRI. Some in favor, some against. There was an alternative suggestion by Schanda to use metamerism index, which is to be investigated. Schanda will discuss this with the Chair on this by email. The Chair expects comments on the draft and the proposals from the TC members to be reflected into the next draft.

TC2-17 Recommendation for integrated irradiance and spectral distribution of simulated solar radiation

Chair: D. Kockott (Germany)

AD: Johnson

ML: Aydinli (Germany), Goodman (UK), Ignatiev (Russia), Justus (USA), Kaase (Germany), Kasten (Germany), Kok (South Africa), Wilkenson (Australia), Zerlaut (USA)

TR: Revise and update CIE Publication No.20 (1972)

ST: AD Johnson has not received report from the chairman. He will re-establish contact with the chairman.

TC2-19 Measurement of the Spectral Coefficient of Retroreflection

Chair: N. Johnson (USA)

AD: Johnson

ML: Arens (USA), Brekke (Norway), Fisher (USA), Hsia (USA), Hubert (France), Kurioka (Japan), Price^o(UK), Rendu (France), Rennilson (USA), Richey (Germany), Schreiber (Germany), Sugiyama (Japan), Terstiege (Germany), Vandermeersch (Belgium)

TR: Identify the critical measurement parameters, tolerances, and requirements for, and conduct an international intercomparison of, the spectral coefficient of retroreflection.

ST: Report given by AD Johnson. The intercomparison work has all been complete. The data are separated into two documents, one contains data, and another is intended to be a report of the intercomparison results for a CIE collection. We held on to this because of one final laboratory that were still to submit data. The Chair hopes to finish it toward the end of the year.

TC2-23 Photometry of Street-Lighting Luminaires.

Chair: G. Vandermeersch (Belgium)

AD: Vandermeersch

ML: Arens (US), Blaser (Switzerland), Blochouse (Belgium), Claassens (NL), Corrons (Spain), Price (UK), Rattunde (Germany), Rossi (Italy), Simons (UK), Sorensen (Denmark)

TR: Prepare a technical report on the photometry of street lighting luminaires

ST: Report given by the TCC. The report will be an addendum to CIE 121. Three aspects will be addressed in the addendum 1) photometric data, 2) photometric methods, and 3) uncertainties. The work has not started yet because the work relies on the D4 document on photometric calculation method in public lighting, now at the final vote. The work should also have a close link to work by CEN, chaired by the same person. For uncertainty, we should consider the results of intercomparison of luminaires by European Commission, which we are still waiting for. (Iacomussi reported that it might be available this fall.) The member roster will also be revised to include Netherlands and representatives from D4.

TC2-24 Users guide for the selection of illuminance and luminance meters

Chair:K. Ganesha (India)

AD: Vandermeersch

ML: Andor (Hungary), Arens (USA), Austin (USA), Bastie (France), Chang (Taiwan), Dibbern (Germany), Eppeldauer (USA), Gardner (Australia), Goodman (UK), Hengstberger (S. Africa), Moore (UK), Muray (USA), Ohno (USA), Rennilson (USA), Ritzol (USA), Sauter (Germany), Sojourner (USA)

TR: Prepare a user s guide for the selection and use of illuminance and luminance meters.

ST: The written report from the TCC was read by the AD Vandermeersch. It summarizes as follows. The TC has been active and has completed the draft of the first two chapters out of eight. The responses for the circulated drafts of these are just being received. Very good constructive comments have been received from some of the members and more are expected soon after the members find themselves free from the heavy work of the D2 meeting. The TCC proposes to hold virtual meetings on Internet and complete the work within a year at best and submit the final draft to the Division. The TCC has observed that some international brands of cheap lux meters of very poor qualities are mass-produced and sold with low prices with attractive presentations. As such, there is a great and urgent necessity to complete this users guide at the earliest. The TCC requests all the D2 members even those who are not presently the members of the TC to participate actively in the TC work. The drafts circulated already are on the web and the members can send their comments.

Moore commented that he had heard nothing from the chairman though he is a member and the former TCC, but he agrees that what is proposed sounds sensible. (The Secretary will contact the chairman to make sure that his circulars be sent to all the TC members.)

TC2-25 Calibration Methods and Photoluminescent Standard for Total Radiance Factor Measurement

Chair:J. Zwinkels (Canada)

AD: Johnson

ML: Bristow (Sweden), Erb (Germany), Leland (USA), McCamy (USA), Nayatani (Japan), Puebla (Germany), Racz (Hungary), Simon (USA), Witt (Germany), Verrill (UK)

TR: Prepare a CIE report on methods for measurement of total radiance factors of photoluminescent materials. Recommendations for realizing and calibrating photoluminescent standards by the one and two-monochromator method swill be included.

ST: Report given by the TCC. The TC last met in May 1999 in Vancouver, B.C. in conjunction with the Inter-Society Color Council meeting. The eighth draft of the TC report was discussed. Revisions were received to Section 2.1 on FWAs in Textiles and Paper and it was recommended to condense the information in Section 4.3 on the Effect of Instrument Polarization and to remove the description of the fluorescence-weakening method in Section 3.1 of the One Monochromator Methods. The other suggested changes were largely editorial in nature and include grouping the References together at the end of the document. These revisions are currently being implemented by the Chairman and the revised document (ninth draft) will be circulated for TC ballot by the Fall of 2000.

TC2-28 Methods of characterizing spectrophotometers

Chair: Peter Clarke (UK)

AD: Johnson

ML: Andor (Hungary), Bastie (France), Berns (USA), Distl (Germany), Eckerle (USA),

Konstantinova (Bulgaria), McCamy (USA), Robertson (Canada), Sugiyama (Japan), Ulyanov (Russia), Zwinkels (Canada)

TR: Write a CIE report on the characterization of spectrophotometers by means of reference materials and other methods, with particular reference to linearity, wavelength error, stray light, and integrating sphere errors.

ST: Report given by the TCC. The third draft was recently distributed, and comments received from the members. The TCC is working on the fourth draft and hopes to circulate it later this year for TC vote and to finish the document by next D2 meeting. The contents of the report was presented at the D1/D2 Joint meeting.

TC2-29 Measurement of Detector Linearity

Chair: T. Goodman (UK) **AD:** Sauter

ML: Andor (Hungary), Bastie (France), Bittar (New Zealand), Budde (Canada), Distl (Germany), Dezsi (Hungary), Mihailov (Russia), Mostl (Germany), Ohno, Parr (USA)

TR: Prepare a CIE guide on methods for the characterization of the linearity of detectors of optical radiation, including different principles by which the linearity of detectors can be determined and causes of non-linear behavior, to aid users of optical radiation detectors in the selection and use suitable devices for specific applications.

ST: Report given by the TCC. This TC has not progressed much in the past year to her regret. The TCC finds it exceedingly difficult to finish this work, and suggests to find another chairperson. Jean Bastie will consider taking the chair. The TCC will wait for his decision.

TC2-30 Array Radiometry

Chair: Jim Palmer (USA) **AD:** Johnson

ML: Abasari (Hungary), Andoh^o(Japan), Goodman (UK), Jones (USA), Mihailov (Russia), Pfleger (Austria), Sauter (Germany)

TR: Prepare an annotated bibliography for the CIE journal on diode array radiometry. Make appropriate recommendations for future work in diode array radiometry.

ST: Report given by the AD Johnson. This TC was reassigned to Jim Palmer recently. No information has been received from him this time.

TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings

Chair: N. Hodson (USA) **AD:** Johnson

ML: Austin (USA), Davies (USA), Dibbern^o(Germany), Hubert (France), Johnson (USA), Lundkvistl (Sweden), Meydan (Australia), Meseberg (Germany), Rennilson^o(USA), Schmidt-Clausen (Germany), Schnell (USA), Schreuder (Netherlands), Soardo (Italy), Sorenson (Denmark) — revised August, 1999

TR: To prepare a guide for the methods of measuring coefficient of retroreflected luminance (specific luminance) of horizontal road markings under wet weather conditions.

ST: AD Johnson reported. The TC had a meeting in Warsaw. They plan a meeting and outdoor testing at the end of May in Denmark to look at wet reflectivity of pavement markings. The subject was divided into measurement of retroreflection of pave markings after rain fall and, the other is during rain fall. Testing procedures proposed are addressing questions on those two aspects. These are highly related to work of Division 4 as well. The TC will probably have a TC meeting in conjunction with Div.4 in Sep. in Toronto.

They have a draft document and expect revisions after the May experiments and the Toronto meeting.

TC2-35 CIE Standard for $V(\lambda)$ and $V'(\lambda)$

Chair: K. Mielenz (USA) **AD:** Johnson

ML: Bastie (France), Gardner (Australia), Hengstberger (South Africa), Moore (UK), Ohno (USA), Parr (USA), Robertson (Canada), Sauter (Germany), Schanda°(Hungary)

TR: To prepare a new CIE Standard on the present $V(\lambda)$ and $V'(\lambda)$ functions.

ST: AD Johnson reported. The status was already reported in Editor's report. The document went out for Division ballot for the deadline of 31 of May. If no problem, it will then be sent for NC ballot.

<Discussion>

Ohno asked about German translation that was done before Division ballot. Sauter commented that some of the country members did not receive the document and he was one of them, but received a request from CIE CB for translation and got the document. He made the translation as requested. Together with translation, Sauter sent some comments on Annex in different format of terminology from ILV and suggested to keep the same format.

Johnson suggested that we need an immediate follow-up on the ballot. Director agreed to contact CB after the meeting. Schanda noted that the CIE procedure is to conduct Board and Division ballot in parallel. Schanda, as well as the Hungarian country member, received the ballot sheet. The document hardcopy will not be sent unless requested. All Division members should be asked to respond for confirmation. The Board should address this issue.

About translation issue, Johnson mentioned that ballots are always sent out in English. Moore suggested that we do not translate the document until we have final agreement on the English version; this is a standard and there will be another ballot by NCs, where more comments are expected, and this document has not come to the final point yet.

Schanda gave information that, at the D1 meeting on 7 April, D1 agreed to establish a new TC to define $\bar{y}_{10}(\lambda)$ to be $V_{10}(\lambda)$ in a technical report. The TC to be chaired by Schanda.

TC2-36 Retroreflection: Definition and Measurement (Revision of CIE Publication 54, Liaison with CEN/226) **AD:** Johnson

Chair: J. Rennilson (USA)

ML: Arens (USA), Couzin (USA), Dibbern (Germany), Heenan (USA), Hubert (France), Johnson (USA), Kramp (Germany), Nanjo (Japan), Price (UK), Schmidt-Clausen (Germany), Sorensen (Denmark), Terstiege (Germany), Werner (Sweden) —revised, August 1999.

TR: To revise and update publication 54. To standardize test methods and measurement geometry for measuring the photometric and colorimetric properties of all types of retroreflectors under both day and nighttime conditions. To prepare this CIE document in ISO format to be issued as a joint CIE/ISO standard.

ST: Report given by TCC. The TC has 15th draft after 8 years. The TC finished last work in Warsaw and went out for Division ballot in last September. Some members did not receive the copy. There was no negative votes but were several comments. The TC met on April

7, and spent 3 and half hours to make relatively minor changes. The 15th draft to be finished and to be sent to editor and then to CB for publication. This concludes the TC work and there will be probably no more meetings. However, important aspect is to prepare a standard from this TC. It should be the responsibility of a new committee with a new chairperson to publish a CIE/ISO standard.

TC2-37 Photometry Using Detectors as Transfer Standards

Chair: Y. Ohno (USA) **AD:** Sauter

ML: Andor (Hungary), Austin (USA), Bastie (France), Bittar (New Zealand), Czibula (Germany), Corrons (Spain), Dezsi (Hungary), Eppeldauer (USA), Gardner (Australia), Goodman (U.K.), K hler (BIPM), Muray (USA), Pietrzykowski (Poland), Rattunde (Germany), Rastello (Italy), Sauter (Germany), Schanda (Hungary), Sojourner (USA), Wychorski (USA)

TR: To prepare a report on the properties of $V(\lambda)$ -corrected detectors that are suitable for disseminating and maintaining photometric units. This report will include methods for the use of these detectors.

ST: Report given by TCC. Apology was given for little progress made for the past year. The 6th draft is almost finished. Some terminology issues were resolved. The section for method for measuring reference plane has been rewritten to include an absolute method and some precautions in practical measurements, e.g., to use a sphere source. Next draft, hopefully a final version before TC ballot, to be circulated shortly.

TC2-39 Geometric Tolerances for Colorimetry

Chair: D. Rich (USA) **AD:** Johnson

ML: Baba^o(Japan), Bittar (New Zealand), Decarreau (France), Fisch (USA), Hanssen (USA), Jordan (Canada), Johnson (USA), Kravetz (USA), Ladson (USA), Terstiege (Germany), Pietrzykowski (Poland), Verrill (UK), Zwinkels (Canada). Consulting member: Erb^o(Germany). —revised June 1999.

TR: Compile a technical report and recommendations specifying the geometric tolerances for the various geometries in colorimetry, including 0/45, 0/d and others. Parts of this technical report may be suitable for inclusion in a CIE standard specifying several geometric tolerance levels.

Working Program:

Utilize ISO 5/1 and ASTM E 1767 to develop a system of specifications for the geometry of color measurements. Define the specifications in the following order: Reflectance factor (t/8, d/8, d/0), radiance factor (45/0) and transmittance geometries (0/0, d/0). Specifications will be developed via computer simulation & verified experimentally.

ST: The TC met for the sixth time on 7 April in Teddington. Three committee members and twelve guests were present. Discussed the requirements to continue revisions of the first draft report. Discussed in Warsaw that we need some experimental verifications of some of the tolerances and definitions that the TC is making. One of the member sent 8MB data and begun to analyze it. Hanson also sent some data. Unfortunately other things that we agreed to add have not been submitted and we are 18 months behind. The TCC hopes to have another draft in fall, and next year to have document close to finish. See Attachment 4 for the TC Activity Report and Minutes of the Meeting, 7 April, 2000 submitted by the

chairman.

<Discussion>

Moore commented that this is one of the most important documents and it is essential that these improved geometries and tolerances be made into a standard. Rich mentioned that the original TR was to produce a standard but TC decided that it was premature. Our goal is produce a technical report with all background information, and then we should be able to draft a standard version from that under a standard committee.

Related to this TC, Schanda and Sagawa added that D1 decided to establish a new committee to write a standard for colorimetry based on 15.3, with Mike Pointer as the chair. Some of the parts of 15.3 should be standardized. 15.2 is now widely used and some other documents refer to this as a standard. Participation from D2 to this committee is welcome.

TC2-40 Characterizing the Performance of Illuminance and Luminance Meters

Chair: R. Rattunde (Germany) **AD:** Sauter

ML: Austin (USA), Bastie (France), Czibula (Germany), Dezsi (Hungary), Goodman (UK), Khandelwal (India), Khanh (Germany), Mahidharia (India), Moore (UK), Ohno (USA), Pietrzykowski (Poland), Saito (Japan), Sauter (Germany), Stolyarevskaya (Russia), Xu (Singapore), Ye (China)—revised July 1999

TR: Convert the present CIE Technical Report No. 69 into an ISO/IEC standard. Prepare a combined CIE/ISO standard describing the definitions of quantities influencing the performance of illuminance and luminance meters, as well as defining measurement procedures for the individual error quantities.

ST: The chairman was here in London, but had to leave early, and no report made this time. The draft document is on the website.

TC2-42 Colorimetry of Visual Displays

Chair: A. Hanson (UK) **AD:** Johnson

ML: Andor (Hungary), Berns (USA), Dalton (UK), Fairchild (USA), Ikeda (Japan), Hardis (USA), Leone (USA), Luo (UK), Maelfeyt (Belgium), MacDonald (UK), McFadden (Canada), Munger (Canada), Reid (UK), Schanda (Austria), Stokes (USA), Sakata (Japan), Stienstra (Netherlands), Ohno (USA), Vienot (France)

TR: To produce a Technical Report summarizing recommended practice for the measurement of the colorimetric and spectroradiometric properties of visual displays.

ST: Report given by the TCC. First draft distributed in January 2000, and the TC met on 7 April in Teddington with nearly 30 participants. The TC deals with emissive displays though it is not indicated in the title. The TC addresses issues in the measurement of x, y, Y - color and luminance of displays and does not deal with electronic side, characterization of displays other than color and luminance, nor appearance. Some more sections to be added for 2nd draft, which is to be circulated next spring. Then 3rd draft is planned for fall 2001 and the final document for spring 2002. A little restructuring of the document after the first outline was circulated and comments received. The current draft includes sections for display technologies, measurement technologies, measurement methods, and recommended practice. Emphasis will be made on measurement instrumentation and how to deal with errors and uncertainties. Membership list will change to include some D8 members.

<Discussion>

Rennilson asked about plasma displays. Hanson answered that if there are specific problems with any other type of displays, we can address the issues and any input is welcome. Rich commented that IEC TC100/TA2, which he serves, is drafting standards for CRT and flat panel, ahead of us. Hanson answered that we keep good liaison with them by himself as well as Ohno and others; the IEC document, as well as another one from VESA, are specifying how to characterize displays, e.g. uniformity and viewing angle, which we do not deal with in TC2-42 document. Johnson asked about liaison to D8 in this activity. Hanson answered that he keeps good contact with them. Ohno also serves as a liaison person to D8 from D2.

TC2-43 Determination of measurement uncertainties in photometry.

Chair: G. Sauter (Germany) **AD:** Sauter

ML: Bastie (France), Corrons (Spain), Goodman (UK), K hler (BIPM), Moore (UK), Ohno (USA)

TR: To prepare a CIE recommendation as basis for the determination of measurement uncertainties valid for selected quantities used in photometry.

ST: Report given by the TCC. The TC met in Teddington and discussed the third draft. The format and style of the document have been agreed. The document is divided into 3 parts: the first part is a summary of information from ISO Guide to the Expression of Uncertainty (GUM), the second part is a selection of examples, and the last part deals with uncertainty of quantities correlated. Part dealing with summary of background is accepted. Examples start with very simple questions, eg. the resolution of meter indicators, operation of incandescent standard lamps at nominal current, and how to handle correlated measurements. Still looking for examples of more practical use. More ideas of good examples are welcome.

TC2-44 Vocabulary Matters

Chair: J. Moore (UK) **AD:** N. Johnson

ML: Billmeyer (USA), Burghout (Netherlands), Ionescu (Romania), Johnson (USA), K hler (BIPM), Morren (Belgium), Nishi (Japan), Ohno (USA), Poppe (Hungary), Sauter (Germany), Schanda (Hungary), Woo (Canada)

TR: To provide liaison between Div.2 and TC 7-06 "Lighting Terminology" and support the preparation of the new edition of the Lighting Vocabulary in the field of light and colour measurements.

ST: Report given by the TCC. The work is being finished. CB is to publish new ILV (International Lighting Vocabulary) soon. The new ILV will be published in electronic form, and it is proposed that this ILV be updated continuously. The Chair circulated 200 definitions and got agreement on only 20 that will be added to D2 terminology. Many terms are still in debate and could not be included in the next version: e.g., spectral mismatch correction factor, and distinction of luminous and radiant from photometric and radiometric. The new ILV is planned to be published this year.

<Discussion>

Hanson asked how the ILV could be updated continuously. Moore answered that update will be made more often on the disk form, and also, there is a suggestion that the vocabulary be

made available on the web in the future (though there are a lot of difficulties). Johnson asked if any date associated with individual definitions available; when ILV has additions and changes, it would be useful to have information on each term when it is added or definition changed. Moore answered that the committee has no plan to do so but he agrees that it will be useful.

TC2-45 Measurement of LEDs - Revision of CIE 127

Chair: Kathleen Muray (USA) **AD:** Sauter

ML: Austin (USA), Bando (Japan), Balta (USA), Berkhout (USA), Bouman (Netherlands), Budzinski (South Africa), Bym (USA), Carr (USA), Distl (Germany), Ellis (USA), Fleischer (USA), Gan (Singapore), Halkin (Belgium), Heidel (Germany), Jones (USA), Kohmoto (Japan), Larsen (Denmark), Marchl (Germany), Moore (UK), Myers (USA), Ohno (USA), Rastello (Italy), Sauter (Germany), Scarangelo (USA), Schanda (Hungary), Solomon (Taiwan), Stolyarevskaya (Russia), Webb (USA), Young (USA) —revised Jul.00.

TR: Revise CIE Pub. 127 to include improved definitions of quantities and methods of measurement for total flux and partial flux of LEDs and to reevaluate other parts including spectral and color measurements of LEDs.

ST: Report given by the TCC. The TC had the third meeting yesterday. The second draft was presented. Major problems are still to be resolved: 1) decision on how an alternate method to replace f_l for LEDs. The same problem addressed by TC2-46. 2) How to measure luminous flux. First question is what quantities are needed. The TC is discussing the total flux (4π) and partial LED flux (2π , etc., with defined reference point). This question is highly dependent on users and applications. More discussions are planned via email. See Attachment 5 for the Summary of the Teddington TC meeting, submitted by the TCC.

<Discussion>

Heidel pointed out an error in membership list. Kohmoto mentioned that f_l is good for white LEDs which will be more practical in the future. Muray agreed to address it. Moore mentioned that the situation of flux seems similar to the case for luminous intensity. If industry use something other than the basic photometric quantities, we should define some arbitrary geometries that can be accepted by industry, just as done for intensity. Muray answered that this was exactly what we are trying to do. Sauter mentioned that total flux is not relevant to alignment and no problem, but when we measure partial flux (hemispherical) we need a reference position of LEDs to define the hemisphere. The current decision is to use the bottom of LEDs located at the plane. In case of intensity, use the tip of LEDs. Conical partial flux may also be interested, then we need definitions for such partial flux. The TC is open to more other geometries if necessary.

TC2-46 CIE/ISO standards on LED intensity measurements

Chair: John Scarangelo (USA) **AD:** Sauter

ML: Angerstein (Germany), Bando (Japan), Bouman (Netherlands), Bym (USA), Carr (USA), Distl (Germany), Ellis (USA), Goodman (UK), Heidel (Germany), Hwang (Taiwan), Jones (USA), Lester (USA), Moore (UK), Ohno (USA), Rastello (Italy), Sauter (Germany), Scarangelo (USA), Schanda (Austria), Schumacher (Germany), Sojourner (USA).

TR: To prepare a CIE/ISO standard on the measurement of LED intensity measurements based on the CIE Pub. 127.

ST: C. Jones reported representing Scarangelo, sending his regret. The TC had its third meeting on April 7 in Teddington (chaired by Jones). The third draft was discussed. Some serious issues have been resolved related to calibration of photometers and radiometers for LED intensity measurements. The TC plans virtual meetings to handle some of the remaining issues.

<Discussion>

Kohmoto mentioned that the recommended LED intensity measurement is no problem for single-chip LEDs, but is a problem for three-chip type white LEDs whose optical axis and spatial distributions are different for each color. The same problem exists for white LEDs with blue chip and phosphor. He suggested a need for a new work in future for intensity measurements for white LEDs. Jones answered that such subject should be discussed with TC2-45 and 46 together.

Schanda mentioned that the recommended method (by CIE127) is to use mechanical axis, not optical axis, so white LEDs should not be a problem. Sauter mentioned that more complicated problems of three chip type LEDs should be dealt with as a cluster of LEDs (in TC2-50). Muray added that special problems of white LEDs will be treated in 2-45 in the last section of the document.

TC2-47 Characterization and Calibration Methods of UV Radiometers

Chair: Gan Xu (Singapore) **AD:** Sauter

ML: Hengstberger (South Africa), Wilkinson (Australia), Lambe (UK), Rattunde (Germany), Saunders (USA), Pietrzykowski (Poland), Corrons (Spain), Larason (USA), Thompson (USA), Kohmoto (Japan), McArthur (Canada), Kravetz (USA)

TR: Prepare a CIE recommendation on methods of characterization and calibration of broadband UV radiometers in the spectral ranges of UVA and UVB for industrial applications.

ST: Report given by AD Sauter. Gan Xu regrets for not being able to be present. Not much progress has been made since Warsaw meeting. The TCC has been in contact with some members of the committee and UVnet WG1 leader to exchange opinions on the content of the new document, and have started to write the introduction and calibration parts. However, opinions are still divided and decisions remain to be made on the following points; whether CIE should adopt the major part of the UVNet WG1 document on UV measurements; whether or not it is meaningful to follow the same approach as in photometry for the characterization of UV meters, taking into consideration that the spectral mismatch in UV measurement is much worse and more complicated than the photometric measurement. The TCC will summarize the situation shortly and write to the members for consensus. The TCC also hopes that the TC has chances to meet either later this year or the first half of next year and have planned to get the first draft ready for discussion by then.

TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers

Chair: G. Eppeldauer (USA) **AD:** Sauter

ML: Austin (USA), Boivin (Canada), Bouman (USA), Corrons (Spain), Coutin (France), Dezsi (Hungary), Gardner (Australia), Goodman (UK), K hler (BIPM), Larason (USA), Larsen (Denmark), McArthur (Canada), Ohkubo (Japan), Palmer (USA), Pietrzykowski (Poland), Rattunde (Germany), Sauter (Germany), Webb (USA), Xu (Singapore),—revised Aug. 99.

TR: To rewrite the technical report CIE 64 (1984) "Determination of the spectral responsivity

of optical radiation detectors" to update device and measurement technology, and include the spectral irradiance responsivity measurement for radiometers and photometers from UV to near IR.

ST: Report given by the TCC. The TC met on April 8 in Teddington. In the new report, we are including modern detectors and also discusses not only spectral power response (beam geometry) but also spectral irradiance response (overfilled geometry) and radiance response measurements. New report describes measurement geometries, methods, setups, and uncertainties. The outline of the first draft was discussed in Warsaw and the scope and table of contents agreed. Since then the second draft (40 % done) was produced and discussed this time. Many suggestions have been made, and the TCC will work on the slight change of the structure and write the rest of the document. The TCC plans to finish the work in three years.

TC2-49 Photometry of Flashing Light

Chair: Y. Ohno (USA)

AD: Vandermeersch

ML: Arens (USA), Austin (USA), Berkhout (USA), Couzin (USA), Ellis (USA), Eppeldauer (USA), Goodman (UK), Hengstberger (South Africa), K hler (BIPM), Kondo (Japan), Rattunde (Germany), Sagawa (Japan), Schmidt-Clausen (Germany), Sauter (Germany), Webb (USA) —revised June 2000.

TR: Produce a technical report for photometric measurements of flashing light, including derivation of the photometric quantities applied to flashing light, measurement of light sources, and calibration of photometers for flashing light.

ST: Report given by the TCC. The TC had its second meeting in London, April 7, 2000 and discussed the new draft (partial draft 0.2). The definition of effective intensity was mainly discussed. The current draft employs the definition of Schmidt-Clausen s Form- Factor method. A problem on the Form-factor method was raised and a proposal (to use convolution) was made by D. Couzin et al, claiming that the Form-factor method would give erroneous values when a narrow pulse is superimposed on a slow pulse. The TC did not agree to adopt the proposed method that has no publication and not enough supporting data. Such investigations would belong to D1. To address such a problem, the TCC suggested to incorporate low-pass filtering (with a time constant short enough not to alter the slow pulse). As there was no time to discuss other parts of the document, the TCC plans to hold a virtual meeting to follow up the discussion.

TC2-50 Measurement of the optical properties of LED clusters and arrays

Chair: G. Sauter (Germany)

AD: Vandermeersch

ML: C. Jones (USA), J. Scarangelo (USA), Xu Gan (Singapore), J. Arens (USA), T. Goodman (UK), D. Halkin (Belgium)

TR: To produce a technical report for the measurement of optical properties of visible LED arrays and clusters, to derive optical quantities for large LED arrays and recommendations for measurement methods and conditions.

ST: The report given by the TCC. This TC was established in Warsaw last year. The start of the work delayed due to major changes of the companies of the initial TC members who proposed the TC. However, at the last ad-hoc meeting on LEDs on April 6th, we are given clear directions of what to do. The proposals in IEC (TC34-A) on photometry of white

LEDs include measurement of clusters and arrays, and the photometry part should be handled by CIE—this TC. There is standardization work in progress in Japan, and this TC will be in close contact with the Japanese group. The work is urgent and the TCC expects active participation and contributions by many members.

Vandermeersch commented that the specifications of LED lamp sources will be covered by IEC34-A (lamps) but the aspect of photometry will be transferred to CIE, which was agreed at the last October meeting in Kyoto. They will meet next week in Helsinki.

TC2-51 Calibration of diode-array spectrometers

Chair: Richard Austin (USA) **AD:** Johnson

ML: T. Goodman (UK), G. Hopkinson (UK), S. Prince (UK), Pietrzykowski (Poland), R. Smith (USA), R. Bergman (USA)

TR: To produce a technical report which sets out guidelines for the recommended procedures, methods and transfer standards for the calibration of diode array spectrometers.

ST: This committee was formed in Warsaw. The initial meeting will be held in Rochester in May 8-10 in conjunction with CORM2000. CORM has a new committee CR6 on this subject which Austin is assisting. Hope to have a first draft before the Rochester meeting.

<Discussions>

Clarke asked about inclusion of spectrophotometers. Austin answered that this TC will deal with spectral radiance and irradiance measurements for sources. There are many similar parameters as spectrophotometers but they apply slightly different in terms of input geometry and calibration methods. Goodman hopes that the document also includes spectrophotometers. Goodman has some document that may be useful for the document and will send it to Austin. Moore commented that he sees the two, spectrophotometry and spectroradiometry, have important differences and are not closely related.

7.2. Reporterships

R2-05 Visual Gloss (J. Taylor, UK) **AD:** Johnson

ST: No report from Taylor this time.

Rich mentioned that, last week at TC130 meeting, WG4 has been working on a draft of standards for measurement of visual gloss - a form of gloss to be used in graphic arts industry, in which they measure gloss and at the same time a component related to diffuse reflectance in order to correct the gloss scale for changes of average diffuse reflectance. The standard is about to come out as draft standard.

R2-06 Standardization of Measuring Geometry for the Colorimetry of Metallic Coatings (C. McCamy, USA) **AD:** Johnson

ST: A written report submitted from McCamy (See Attachment 2). It summarizes as follows. Both ASTM and DIN have continued to pursue standardization of a method of measuring the colors of metallic materials. The German work is nearing completion and the standard will probably be issued at about the time of the CIE meetings in UK this April. The American standard is near completion and the committee responsible for it is turning to the somewhat more complex task of standardizing measurement of the colors of materials

containing interference pigments. There has been divergence of opinion on the choice of angles for measuring metallic materials. The largest aspecular angle in the proposed German standard is 75., while that in the American proposal is 110...The German proposal includes some mandatory tolerances. American standards do not usually contain tolerances except where matters of safety are involved. These differences in standards will present a substantial problem to the paint and plastic industries. No effort yet to standardize the measurement of materials containing interference pigments. McCamy recommends considering formation of a technical committee and suggests asking Dr. Allan B.J. Rodrigues of DuPont in the United States to chair the committee, who is a leader in the metallic paint industry and is the chairman of the ASTM committee on this subject. (to be discussed in section of new TC)

Terstiege added that German standards committee recently met and finished the German standards as DIN standard, to be published in August-September this year.

R2-18 OIML Matters (G. Sauter, Germany) AD: Sauter

ST: Sauter reported. There are currently no activities that need actions by CIE but some issues may come up in illuminance measurement. The reporter suggests to keep this reportership open.

R2-19 Emergency Lighting Luminaires (Lou Bedocs, UK) AD: Vandermeersch

ST: The details on this issue was discussed at the ad-hoc meeting on April 7. The written report from Bedocs was read by Vandermeersch. An assessment of the photometry of emergency lighting luminaires was made. The findings indicate that the emergency lighting luminaires have to provide lighting conditions similar to normal luminaires but at much lower levels, and at a specified time after turning on for a set period. Therefore, emergency lighting luminaires can be treated as a special variant of standard luminaires. There are two types of luminaires, self-contained with power source built in, and those with remote power sources. The photometry of these two types of luminaires can be made by the testing procedures given in CIE 121 (Photometry and Goniophotometry of Luminaires). There is a need to provide additional correction factors on the relative output of the luminaires and circuit as specified times of operation. Also it is necessary to provide ballast lumen factor for the luminaire circuit. Recommendations: D2 should agree that no new separate publication be produced for photometry of emergency luminaires. D2 should publish an addendum to CIE 121 which should contain the definitions and meanings of the photometric factors together with examples how to apply them. D2 to terminate this reportership. (See later section for New Reporterships.)

R2-21 Use of detectors as absolute transfer standards for spectroradiometry (N. Fox, UK)

AD: Sauter

ST: Goodman reported. Much work is going on in the use of absolute transfer standard detectors for spectroradiometry, but is not yet at a stage to establish a TC. Fox suggests to keep the reportership open.

R2-22 Implementation of SI Photometric Units (R. K hler, BIPM)

AD: Sauter

ST: Sauter reported. K hler sent a message stating that, due to the fact that there are no real

activities to create new $V(\lambda)$ function in near future, he recommends to close down this reportership.

<Discussion>

Sauter mentioned that we just learned from D1 that $V_{10}(\lambda)$ will be defined. Schanda mentioned that this could be a liaison issue. Separate from this, he made a comment that, every year Division gets report of a few lines from many of the reporterships and no proposals. If a lot of things are happening, we should have more detailed reports. Moore mentioned that the principle function of the reporter is to make a recommendation whether or not we should have a new TC or not. Sagawa mentioned that Kohler is the official liaison person in D1 for D2. Goodman proposed to close this reportership because we have liaison to CCPR through Kohler and this will do the job when the issue has come up. The Division agreed to close the reportership with no objection.

R2-23 ISO/CIE Standards for the measurement of reflectance and Transmittance (Danny Rich) AD: Johnson

ST: Rich reported. As this is the first report from this reportership since its inception at the Division 2 meeting in Warsaw last summer, the reporter do not have a great deal of new information to report. The reporter has found some technical errors in Publication CIE 130 that he has reported to the Division Secretary and requested independent verification. There is a round-robin being conducted in a CORM technical subcommittee on Optical Properties of Materials on diffuse reflectance using research grade instrumentation over the range 360 nm to 780 nm at 5nm intervals. The current plans are to have four industrial research labs participate and the results will be presented at the 2001 CORM meeting in Gaithersburg, MD just prior to the next Division 2 meeting.

R2-24 Classification of Color Measurement instrument (Ohno) AD: Johnson

ST: Ohno reported. This reportership was established in Warsaw by request from D8. There is the same reportership in D8 with Ohno as the reporter. D8 likes to have guidelines as to how accurate various color measuring instruments are, and in what cases what kind of instruments should be used. Problem is that the performance (the uncertainty) of the instruments is not clear from manufacturer s catalogs. E.g., in case of display measurements, they show uncertainty for only CIE illuminant A (which is similar to repeatability of the instrument) and users tend to believe this is the uncertainty for measurement of all colors of display. The errors can be one order of magnitude higher for display colors. They like to have a standardized way to characterize or evaluate the uncertainties of these instruments and thereby to grade the performance, as being done for illuminance meters in TC2-40 (class A, B, C, etc.). Ohno has an idea of using color rendering index (CIE 13.3) as presented at TC2-16 meeting on 7 April, and will investigate this further. Ohno suggests to keep this reportership open for another year.

<Discussion>

Answering question from Dave McDowell, Ohno mentioned that this would include spectrophotometers as well as spectroradiometers for displays. Rich asked 1) how one can separate the instrument performance for displays from the performance to reproduce surface colors (CIE13.3), 2) those sampling of Munsell space (CIE13.3) is designed for spectral distribution of lamps with low chroma. An instrument that can measure these 13.3

samples may fail to measure other high-chroma samples accurately. Ohno commented that these details should be studied but he hopes that the differences of measurement targets (between lamps and samples) may correlate well and hopes to come up with an index like f_1 . McDowell suggested to investigate different metamors, e.g., spectral reflectance curves with more abrupt changes. Ohno mentioned that the reference samples can be replaced by other colors and these problems need to be investigated and asked for help.

R2-25 Liaison with IALA (Ian Tutt) AD: Vandermeersch

Report given by Tutt, who is a member of IALA (International Association of Lighthouse Authorities). IALA is revising Standard for Photometry of Marine Aids-To-Navigation Signal Lights (1977) under a working group established last June. This is designed to complement 1977 document and to be seen as a standard. The draft will go to IALA Engineering Committee after Easter when they next meet. If they accept it, they look towards approval of this document by CIE as a CIE standard. The IALA committee will welcome any comments on the comments. Any one need to see copies, contact Secretary. The document recommends the use of Schimdt-Clausen's method to calculate effective intensity for flashing light. During this process, we compared various LED beacons using existing methods. There are several methods included in the document including zero-length photometry—a specific technique for measuring search lights.

There was a question about the term zero-length photometry. Moore suggested that terminology in this area be carefully determined and possibly to be included in the ILV.

Tutt added that there is a proposed study in Europe on visual perception and measurement of flashing lights. Trinity House is a partner of the study. The proposal is at European Commission for their approval.

7.3. Liaison report

CCPR (K hler)

No report received this time. Sauter, as a CCPR working group member, gave the following information. The MRA (mutual recognition agreement) for equivalence of the units among national laboratories was signed in October 1999. To achieve the equivalence, so-called Key Comparisons are carried out, first at the CCPR level, then at RMO (Regional Metrology Organization) level. The Key Comparison for luminous intensity and luminous flux using transfer standard lamps have just been finished with the final draft approved. 16 countries participated at the CCPR level and 10 participated in the European RMO intercomparison for the luminous intensity and luminous flux units.

IEC TC34A on Lamps, TC34D on Luminaires (Vandermeersch)

Vandermeersch reported. As discussed at the ad-hoc meeting on white LEDs the day before, the proposals on white LEDs were made last year in TC34A. The work has not started at IEC. The decision will be taken next week in Helsinki, regarding the part to be submitted to CIE Div. 2. This question was also discussed in TC34D (luminaires). This new type of LED lamps are already used for signaling of emergency luminaires. Arrays of white LEDs, where we have a problem that we have no requirements for uniformity of luminances of this

type of signs. Vandermeersch is a liaison in this committee for CIE, and liaison is working well.

IEC TC100/PT61966 -Colour Measurement and Management in Multimedia System (Y. Ohno)

Ohno reported. Written report received from H. Ikeda, reporting that the former PT61966 has been restructured as TA2 (Technical Area 2) and that they had the first TA2 meeting in Tokyo a few weeks ago. The meeting minutes are on the D2 website. Liaison is maintained at D2 level (Ohno) and also by TC2-42. TA2 appreciates first draft of TC2-42. Many documents are being developed in TA2 and some D2 members (Ohno, Schanda, Hanson, and Rich) reviewed these documents (not all and not completely) and sent comments. The sRGB standard (Part 2) has been published last October. Part 3 (CRT) and 4(LCD) both have just been published. Part 5 (Plasma display) and Part 6 (Image projection) are being developed. Part 9 (Digital camera), which Ohno made some contribution last year, is in its final stage. They plan to develop some more documents.

<Discussion>

Schanda mentioned that this group is working extremely hard and very fast. Part 1 is the area CIE should be responsible. CIE should start working on it as soon as possible. Ohno will look into this for necessary action by D2.

JTAG2 —ISO/IEC Joint Technical Advisory Group 2 (Y. Ohno)

McDowell, the chair of JTAG2 was present to give a report. This is a joint ISO IEC committee to coordinate among all ISO, IEC, and CIE committees involved in imagery. Measurement is a big part of the coordinating activity. JTAG2 meets every 9 months. Currently CIE representative to that is Tim Kohler from CIE D8 (Alan Robertson formerly represented CIE). He will send reports to D2 Secretary. Now there are not much issues that directly affect D2. Mainly it is a forum for exchange of concerns and recommendations to CIE and IEC committee for action and ISO technical management board. One important thing that occurred recently is that JTAG2 made a recommendation that procedures be modified to enable true joint activities between CIE, IEC and ISO. Today if we want to have a joint standard with CIE/IEC/ISO logo, the only process is to develop a document in one organization and sent to others for yes/no vote. There is no mechanism in place for truly joint development. We welcome any concerns you have, sent to Tim Kohler or McDowell. If D2 or D1 sees enough concerns on imagery issues and they wish to have representative, it would be possible, too.

There are a number of related activities. ISO TC42 photography and ISO TC130 graphics arts are two image committees that interact most with CIE. IEC/TC100 multimedia, an IEC committee that deals with characterization of display devices, as well as printers, cameras and detectors. TC42 photography is also looking at characterization of electronic capture devices. TC130 as well as industry consortium, ICC, who are developing color management techniques and characterization of output devices. McDowell is AD of D8 for liaison. True joint activity is important and we make sure that imaging community keep CIE informed.

ISO TC6/WG3 Paper, board & pulps (J. Zwinkels)

Zwinkels reported. Written report already submitted to Secretary (see Attachment 3). This committee will meet in Vancouver in September. Number of issues that is interest within

this WG. One of these is the standard for measurement of gloss at 20°. Question is which refractive index, wavelength, and standard illuminant should be used in the definition, and the calibration of reference instruments —specialized spectrophotometers at d/0 geometry defined by ISO2469. Past year Zwinkels reviewed two ISO draft standards and sent to CIECB, One was determination of color in C/2 geometry. Another ISO draft standards called Paper and board: Measurement of specular gloss - 75° gloss with a converging beam, TAPPI method. Gave extensive comments and raised concerns over their relaxation of the geometric tolerances. Pointed out that these tolerances were unacceptably large and contrary to the findings in published studies on the instrument variables. Another ISO 2469 Measurement of Diffuse Reflectance Factor is now under revision. ISO 2470 Measurement of diffuse blue reflectance factor (ISO brightness) is also under active revision. Received correspondence from Secretary about a concern raised by Ellen Carter that the ISO subcommittee was defining the UV content of Illuminant C for measurement of fluorescent materials. A reply was sent to her to clarify that the committee is proposing to redefine ISO brightness and not to redefine Illuminant C. Zwinkels will follow up on this committee to make sure they will not violate the CIE's territory.

ISO TC 180/SC 1: Solar energy/Climate - Measurement and data (Dieter Kockott)

No report has been received this time.

Division 8 (Ohno)

D8 added a new TC8-06 (Image Technology Vocabulary) chaired by Schanda. TC8-02 has a very comprehensive draft and some interest by D2. D8 has a reportership (Grading of instruments)—the same one as R2-24 as reported above. D8 will meet in Derby after this D2 meeting. See Attachment 7 for the summary of the status of D8.

Moore commented that grading of instruments is very important and is something that D2 has been concerned for a long time.

8. Dissolution of TCs and other functions

Division 2 agreed as follows.

- (1) R2-22 Implementation of SI Photometric Units, is to be closed as proposed by the reporter.
- (2) R2-19 Emergency Lighting Luminaires, is to be closed since a new TC is to be established from the reportership (See next section).

9. Proposal for NEW TCs and Reporterships

New TCs

(1) Photometry of Emergency Lighting Luminaires (Vandermeersch)

TR: To produce an addendum to CIE publication 121 containing specific requirements for the photometry of emergency lighting luminaires, in particular to provide additional correction factors on the relative output of the luminaires at specified times of operation.

Vandermeersch proposed to establish this new TC, as proposed from R2-19 by Bedocs. Keep the same document number since this document (CIE121) is already referred in other European and international documents. The addendum will define proper correction factors for use in emergency luminaires, and also provide practical methods to measure such type of luminaires because the total luminous flux of luminaire is to be measured as a function of time, and an integrating sphere must be used rather than a goniophotometer.

<Discussion>

Answering a question by Moore, Vandermeersch added that the correction factor is due to the fact that normally all measurements for luminaires are expressed in cd/1000 lumens using catalog lumen values of bare lamps, but in emergency luminaires, the flux of bare lamps are quite different because of built-in power supplies and operation time. Moore also asked if any correction is needed for mesopic region. Vandermeersch answered that photopic value is used over 30 years and this cannot be changed. Sauter suggested to give a better terminology for this correction factor. Vandermeersch volunteers to chair this TC with help of Bedocs and other members. Schanda commented that we need to be very careful with CIE-IEC-CEN cooperation as he remembers that final votes for documents often came out with one or two negative votes from European countries because the document is not identical with the CEN draft; it is critical to work with CEN committee at early stage.

<Decision>

D2 agreed unanimously to establish this new TC.

(2) CIE/ISO standards on retroreflectance measurements (Rennilson)

A proposal made from Rennilson to publish a CIE standard on retroreflectance, by taking the important contents from the TC2-36 report (Revision of Pub. 54 to be published).

<Decision> Since the TR and chairperson have not been proposed, Division agreed to defer the decision. Rennilson will prepare proposed TR and chairperson and circulate first to TC2-36 members. The Division will then vote by email.

(3) Measurement of metallic coatings (McCamy)

A new TC was proposed in the McCamy's report for R2-06. Johnson explained that the proposal is to take the work by ASTM and DIN committee to issue a standard and turn this into an international document that would recommend the measurement angles, calibrations, and other aspects of measurement for metallic materials.

<Decision> Since a TR was not prepared, Division agreed to wait to see it before voting. Johnson will work with McCamy to prepare TR and to circulate it for division voting.

(4) Definition of star magnitude (Rastello)

Rastello relayed the proposal from Paolo Soardo. The tentative TR is to establish the relationship between astronomical magnitude and the SI unit, lux. The reason for this proposal is present tension on lighting pollution problem. Some documents have already been issued by Div.4. Liaison to be made with D4 and IAU (International Astronomers Union). The objective is to write a technical report then later to publish a CIE standard.

<Discussion>

The proposal was not clearly understood (Moore et al). Schanda mentioned that other Divisions (4 and 5) deal with astronomical communities (stray light, dark sky, etc), and suggested to bring it up at next board meeting to ask their opinion, then if necessary, to

establish a reportership to collect information to make judgement. Rennilson mentioned that we should get input from IDA(International Darksky Association), and try to get information. **<Decision>** Director will bring up this issue at next Board meeting to get inputs from other Division directors and, if it is found necessary, will establish a reportership.

10. General Issues

(1) Handling of TC documents on the website

We had some discussions by email before this meeting. To summarize it, we have three possible options —1) have the draft totally open, 2) restrict to people on the D2 mailing list with a global password, 3) restrict each document for TC members only with each password for each TC. We need to bear in mind that CIE drafts should not be available for CIE non-experts. Code of practice says the draft documents are only available for TC members. If we did other than option 3), we would be against the code of practice. Reason is that there are often errors in early drafts, and wide dissemination of such could be a lot of confusion and damage the reputation of CIE. Also, publication is a valuable source of income of CIE. Draft toward at their final stages is quite temptation for some people to use it rather than buying the documents.

Ohno suggested another option to combine option 2 or 3 above, choose the ways depending on the TCs and the stage of the draft. The decision may be left to TC chairs. Ohno mentioned that he could set up the D2 website for any of these options. Sauter mentioned that, if we choose option 3, there is a possibility that some people become a member of TCs only to get draft documents. Goodman answered that it is left to discretion of TC chairperson to accept only those members who are contributing to the TC. Terstiege agreed to Sauter's comment. Schanda pointed out that the code of practice says it is a task of TC chairperson to drop inactive members. Moore suggested that TC chairs should be warned for this practice. Moore commented that he prefers option 3 and is against option 1. N. Johnson suggests to differentiate between the draft and the approved document by clear background on the document saying DRAFT, then it would be no problem to have it open. Rennilson mentioned that National Committees can request anyone from the country to be on the committee whether or not he or she contribute to TC or not. Schanda answered that such person can be accepted first, but later should be dropped. Austin commented that, option 3 can still work for Johnson's concern because if some non-members ask for a draft copy, the TC chair can send it electronically to such persons under his discretion. L. fberg is hesitant to have drafts open to everyone. People still have access to the list of TC, TR, and other information on TCs, so if people are really interested in some draft document, they can contact TC chairs or someone and they can get the document. He suggests to use option 3 or combination of option 2 or 3. Goodman asked, if we have individual password for each TC, could it be possible to update the password to exclude inactive members? Ohno answered it is technically possible. Kathleen thinks option 3 is the best option, but regarding to excluding inactive members, she wonders what is the definition or the rules to decide who is actively participating TCs. Goodman answered that it is up to the TC chair. Schanda suggests to visit CIE website to see the Code of Procedures. Sauter suggested to charge a very small amount of price to visit the draft page on the website, then the problem of the income may be solved. Goodman answered that it is beyond what we can decide here.

Director Goodman took vote on the options from all the participants. The result was 7 for option 1, 10 for option 2, and 10 for option 3. Goodman suggests that we choose option 3 for the moment because of the Code of Practice, but will present this at the board for discussion and their advice on this issue.

(2) Other subjects

Due to shortage of time, other subjects on the agenda will be discussed via email reflector.

11. Future meetings

2001

May 16-19 at NIST, Gaithersburg, Maryland, USA, in conjunction with CORM2001 (Council for Optical Radiation Measurements) on May 14-16 and with the NIST Centennial Celebration. D2 main meeting will be Saturday, May 19.

2002

As there have been no proposals from any countries, Director suggested to have another joint meeting with Division 1 (planned in conjunction with AIC Session in Slovenia). Schanda also offered an invitation to Univ. of Veszprem in Hungary. Any other proposals can still be considered.

2003

San Diego, California, USA, around last week of June to first week of July, as a part of CIE 25th Quadrennial Session.

12. Adjournment

The Division 2 meeting was adjourned at 5:30 pm.

Attachments

- (1) Agenda of the 2000 Division 2 Meeting
- (2) R2-06 report, March 17, 2000 (C. McCamy)
- (3) ISO TC6 WG3 report (J. Zwinkels)
- (4) TC2-39 Committee Activity Report and Minutes of the Meeting, April 7, 2000 (D. Rich)
- (5) TC2-45 APRIL 6, 2000 Teddington Meeting; Summary of Results (K. Muray)
- (6) TC2-49 Committee Activity Report, April 2, 2000 (Ohno)
- (7) Summary of CIE Division 8 (Ohno)



COMMISSION INTERNATIONALE DE L'ÉCLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

Division 2: Physical Measurement of Light and Radiation

2000 Division 2 Meeting
NPL, Teddington, UK
April 8, 2000
10:45 - 17:30

Agenda

1. Attendance list, apologies
2. Approval of agenda
3. Approval of the minutes of 1999 Division meeting
4. Director's report
5. Secretary's report
6. Editor's report
7. Progress reports from Technical Committees, reporters and liaison persons
 - 7.1. Associate Director Vandermeersch and TC chairpersons
 - 7.2. Associate Director Johnson and TC chairpersons
 - 7.3. Associate Director Sauter and TC chairpersons
 - 7.4. Reporters
 - 7.5. Liaisons with other organisations
8. Proposals for dissolution of TCs and reporterships
9. Proposals for new TCs and reporterships
10. General issues
 - 10.1. How future Division 2 meetings should be structured
 - 10.2. New form of CIE publications ('handbooks')
 - 10.3. Handling of TC draft documents on the website
 - 10.4. Symposium
 - 10.5. How to take CIE into the 21st Century
11. Future meetings
 - 11.1. 2001
 - 11.2. 2002
12. Adjournment

Attachment 2

C. S. McCamy

Consultant in Color Science

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March 17, 2000

Yoshi Ohno

National Institute of Standards & Technology

100 Bureau Drive, Mailstop 8442

Gaithersburg MD 20899-8442

Dear Yoshi:

Accompanying this letter is the report to CIE Division 2 from the Reporter R2-06 on Standardization of Measuring Geometry for the Colorimetry of Metallic Coatings. I regret that I will not be at the meeting in the United Kingdom to present it. I find that however fast I run or fly, I can be in, at most, two places at once.

At the end of the report, I recommended considering formation of a technical committee. If I may, I suggest that the Division consider asking Dr. Allan B.J. Rodrigues of DuPont in the United States to chair the committee. He is a leader in the metallic paint industry, he is the chairman of the ASTM committee on this subject, he has years of experience in standardization, he is a good organizer and leader, he gets things done, and his company has a substantial interest in this activity and is capable of supporting it.

In any case, I need to divest myself of some administrative and reportorial responsibilities so I can devote more time to pressing theoretical work, which is where I think I can make the most useful contributions. If the division decides not to form a technical committee, I suggest considering Dr. Rodrigues to become the reporter on this subject. If there is a need, I might be able to suggest some other possibilities.

Very best regards.

Very truly yours,

C. S. McCamy

**Report to CIE Division 2
from
Reporter R2-06 on Standardization of Measuring Geometry
for the Colorimetry of Metallic Coatings**

C. S. McCamy
March 17, 2000

As reported on June 10, 1999, both the American Society for Testing and Materials (ASTM) and the German standards organization (DIN) have continued to pursue standardization of a method of measuring the colors of metallic materials. The German work is nearing completion and the standard will probably be issued at about the time of the CIE meetings in the United Kingdom this April. The American standard is near completion and the committee responsible for it is turning to the somewhat more complex task of standardizing measurement of the colors of materials containing interference pigments. There has been divergence of opinion on the choice of angles for measuring metallic materials. A clearly cooperative attitude abounds, but there are honest differences of opinion. The largest aspecular angle in the proposed German standard is 75°, while that in the American proposal is 110°. The German proposal includes some mandatory tolerances. American standards do not usually contain tolerances except where matters of safety are involved. Whether or not these international differences in standards will present a substantial problem to the paint and plastic industries is not known at this time. The international character of the automotive industry, where metallic finishes are very prevalent, suggests that possibility. No such technical polarization has developed as yet in the initial stages of the effort to standardize the measurement of materials containing interference pigments.

Some consideration should be given to the formation of a CIE technical committee on the measurement of metallic and interference colors. An international effort could foster uniformity of practice in this field. The chairmen of the corresponding standards committees in America and Germany could offer valuable guidance in deciding whether or not formation of a committee would be desirable.

(The letter and this report were posted at D2 website since March 20, 2000)

Attachment 3

ISO TC6/WG3 Report for CIE Division 2 Meeting in Teddington, UK, April 2000 Joanne Zwinkels

The most recent meeting of TC6/WG3 was in May 1999 in Helsinki, Finland. The next meeting will be in conjunction with the ISO/TC6 meeting in Whistler, B.C., Canada, September 25-30, 2000. The main issues that will be discussed are: (1) the calibration of reference instruments by authorized laboratories; and (2) the question of which refractive index, wavelength, and reference illuminant should be used in the definition of the gloss scale in ISO 8254-3 Gloss at 20°.

The following ISO draft standards were reviewed and comments sent to CIE CB: ISO/FDIS 5631 Paper, board and pulps — Determination of colour — (C/2) Diffuse Reflectance Method and ISO/FDIS 8254-1 Paper and board: Measurement of specular gloss Part 1: 75 degree gloss with a converging beam, TAPPI method. In the former case, the comments were generally editorial and included changing an equation to be consistent with CIE Publication 15.2:1986 and adding ISO/CIE standard 10256 to the Bibliography. In the latter case, the comments were extensive and raised concerns over the general relaxation of the geometric tolerances. It was considered that these tolerances were unacceptably large and contrary to the findings in published studies on the instrument variables in measuring 75° specular gloss. This standard is now in final version and is to be submitted for parallel CEN and ISO balloting.

ISO Standard 2469 Paper, board and pulp: Measurement of Diffuse Reflectance Factor was last approved in 1994 and this standard is under active revision. ISO Standard 2470 Paper, board and pulp: Measurement of diffuse blue reflectance factor (ISO brightness) is also under active revision. There was some concern from a CIE member (Dr. Ellen Carter) that the ISO subcommittee was defining the UV content of Illuminant C for these ISO brightness measurements. A reply was sent to clarify that the committee is proposing to redefine ISO brightness and not to redefine Illuminant C.

Committee Activity Report and Minutes of the Meeting

7 April, 2000

CIE TC 2-39

Geometric Tolerances for Color Measurement

Terms of Reference

Compile a technical report and recommendations specifying the geometric tolerances for the various geometries in colorimetry, including 0/45, 0/d and others. Parts of this technical report may be suitable for inclusion in a CIE standard specifying several geometric tolerance levels.

Working Program

Utilize ISO 5/1 and ASTM E 1767 to develop a system of specifications for the geometry of color measurements. Define the specifications in the following order: Reflectance factor (t/8, d/8, d/0), radiance factor (45/0) and transmittance geometries (0/0, d/0). Specifications will be developed via computer simulation & verified experimentally.

Current Committee Membership:

A Bittar (New Zealand), J. Taylor (United Kingdom), E. Early (USA), L. Hanssen (USA), G. Baba (Japan), B. Jordon (Canada), J. Zwinkels (Canada), K. Witt (Germany), N. Johnson (USA), D. Rich (USA), Chairman, R. Fisch (USA), J. Pietrzykowski (Poland), A. Kravetz (USA), J. Ladson (USA), J. Decarreau (France)
Consulting Member: W. Erb (Germany)

Status

The Committee met for the sixth time just prior to the CIE Division 2 meeting in Teddington, England at the National Physical Laboratory. Three committee members and twelve guests were present. An agenda was handed out and an additional item added concerning the work of ISO TC 42 / ISO TC 130 joint working group 21 who are revising the standards ISO 5 parts 1 to 4. The revised agenda was approved. The minutes and activity report from 1999 were reviewed and approved.

The Technical Committee Chair (TCC) reviewed the action items from the last meeting (see document 2-39/15). Many of the action items were not completed and so a second draft of the committee report has not yet been prepared. Measurement data was received from committee member G. Baba. The data have been put up on the Division 2 web site for access by CIE Division 2 and TC 2-39 members. The data show clear confirmation of the geometric definitions and tolerances recommended by the committee. As a result of the lack of activity from the committee members, the program of work is now 18 months behind schedule.

Mr. D. McDowell, Chairman of ISO TC 130 reported on the work of Joint Working Group 21 formed between ISO TC 42 and ISO TC 130 to revise ISO 5, parts 1-4. Explained the philosophy of the JWG and the progress to date. D. Couzin asked about whether ISO 5 set

specifications on the azimuthal angles. D. Rich commented that it does indeed specify annular illumination but does allow discrete circumferential approximation to the full annular geometry. Mr. McDowell also raised the issue that ISO 5/4 defines a diffuse transmittance geometry that uses an opal glass diffuser instead of an integrating sphere and wondered if this geometry could be added to the TC 2-39 report. N. Johnson commented that we could try to add a definition of opal glass diffuse transmittance to the section of the report that covers diffuse transmittance. Committee members thought that it would be a good idea if we could get a good definition of the geometry. D. Couzin thought that it might be possible to treat the system as opal glass + specimen rather than making the opal glass part of the instrument. D. Rich commented that committee E. Early has recently published work done at NIST on this type of measurement — indicating that NIST had established and was providing realizations of a scale of opal glass diffuse transmittance. The TCC will follow up with Mr. Early about this measurement geometry. Mr. McDowell volunteered to send the committee copies of a paper that he wrote that describes the correspondence between opal glass transmission density and integrating sphere transmission density on two color film bases.

Incorporating the opal glass diffuse transmittance specifications will bring together the work of CIE Division 2 and ISO TC 42 and TC 130. J. Taylor of NPL commented that the committee should make every effort to bring these three groups together and harmonize the two geometric specifications even further than we have to date. Mr. McDowell indicated that current reports, drafts on working documents from the ISO JWG can be found on the web page at (www.pima.org/tc42/programofwork/JWG21/). The TCC will submit documents to ISO JWG21 through Mr. McDowell in order to form a closer liaison with them on drafting standards on the geometry for color measurements.

Mr. Andrew Hanson of NPL commented, indicating that he has been testing integrating sphere uniformity and geometric tolerances as well. He supplied some print-outs of goniophotometric characterizations of several different materials standards. His results show very similar behavior to that of Mr. Baba and is in qualitative agreement with the experiences of committee member, N. Johnson. Mr. Hanson also commented that some instruments exhibit spatial displacements of the influx or efflux images in the specimen plane.

Committee member, J. Zwinkels reported on some additional changes that need to be made to the draft document. Some of these changes had already been suggested and noted at the Warsaw meeting last year. Others were truly new changes and were noted in Draft 1 and will be incorporated in the next draft. She also requested that the next draft put the definitions and specifications back into tabular form rather than in textual form.

The committee desires to hold the next meeting in conjunction with the Council on Optical Radiation Measurements meeting, to be held in Gaithersburg, Maryland in May of 2001. Mr. McDowell invited the TC members to attend the next meeting of JWG²¹ which will be held in the fall of 2000 in Tokyo, Japan.

APRIL 6, 2000 TEDDINGTON CIE-TC2-45 MEETING; SUMMARY OF RESULTS.

The rather short meeting centered around the two major problems: 1.) defining the new quantities for LED luminous/radiant flux evaluation in an integrating sphere and 2) finding a formula to estimate the detector-filter combination suitability for photometric measurements.

- 1.) Definition for LEDs partial flux: $4\pi/x$: x could be any number >2 ; if the solid angle is too small, this definition would merge with the "averaged LED intensity" definition. To hold these definitions simple, it was proposed that the solid angle for any partial flux measurement should start from the tip of the lens, along the geometrical axis of the LED. When partial flux is measured in the integrating sphere the LED should be inserted at the side-window such, that the radiation entering the sphere within the solid angle starting from the tip of the lens along the geometrical axis of the LED should correspond to the $4\pi/x$ value.

For total flux measurement, the LED can be totally inserted inside the sphere, or from a side-window, if the backside radiation is not considered.

In the case when $x=2$, the hemispherical radiation measurement might be unanswered with the new definition; if it is important that none of the radiation coming from the backside of the chip should be included, but every part of the radiation going into the forward direction should be counted, the positioning of the LED cannot be defined easily for the many different types.

A) The main question here is: how important is the small error caused by insertion to the tip of the LED instead of to the position of the chip for certain applications or can this be neglected.

- 2.) Solution to this problem has to include the white LEDs, where similar function as f_1' might be suitable; or using an other weighting function instead of CIE "A" source, or not use any, just express the integrated errors for different wavelength regions.

These problems will have to be decided together with the members of TC2-46, since they have to introduce the same solution into their final report.

No new meeting has been scheduled. Please respond to let me know your opinion on these questions, so I could finalize our recommendations. (Third and hopefully last draft) If we need one more meeting, we can schedule one either late Fall this year or early next year. Please let me hear your opinion on this matter as well.

Final remark: Next mailings will be sent only to those members who indicate their interest and active participation in TC2-45, by responding promptly. Please Try!

Wishing you all a pleasant spring and summer (I hope we have more correspondence before Fall, so I have time to wish you a pleasant winter later)

Kathleen Muray

TC2-49 Committee Activity Report

April 2, 2000 (Before London meeting)

Y. Ohno

1. Workshop on Photometry of Flashing Lights, Warsaw, June 25, 1999

- Report published in CIE Pub. 133, Proc., 24th Session of CIE, Vol.2, 64-67 (1999)
- http://nml.csir.co.za/~cie2/meetings/1999_Warsaw/Workshop_Proceeding4.htm

2. TC2-49 Meeting, June 29, 1999, Warsaw

Attendees:

Y. Ohno, R. Distl, P. Kohn, J. Berkhout, M. L. Rastello, T. Larason, G. Sauter, P. Webb, G. Eppeldauer, A. Bouman, L. L. Larsen, P. Kärhä, T. Goodman, M. Budzinski, K. Muray, C. Jones, H. Kondo, F. Hengstberger, R. Stolyarevskaya, G. Xu, J. Scarangelo, R. Kohler, U. Kucuk, R. Austin, (underline: then member)

New members after the meeting:

David King, R. Kohler, Jan Berkhout, H. J. Schidt-Clausen, J. Rennilson

Distribution: CIE TC2-49 Report (Draft 0.1) – June 18, 1999

Discussion:

- (1) Form Factor method should be included TC agreed.
 - (2) Multiple flash should be defined in this document to be discussed further.
 - (3) Background (DC component) over a flash should be addressed not agreed.
 - (4) Detector linearity issues to be covered in detail agreed.
 - (5) Spectroradiometric methods (for photometric purpose) to be included agreed. (for diode-array/CCD spectroradiometers only).
 - (6) Details of the requirements of photometer head should not be included agreed. (refer to Pub. 69 and TC2-37 document)
 - (7) Section of derivation of quantities be changed to calibration of photometers agreed.
 - (8) Timeframe of completing the document 3 years
 - (9) Scope is accepted with no changes.
- The chairman requested further comments by email.

3. Papers received from Schimidt-Clausen

- (10) A Comparison of different methods for the determination of the effective luminous intensity of singal lights in the form of Multiple pulses, CIE-Journal, 1-1 (1982)
- (11) Investigation of the spectral luminous efficiency and the signal process in the human eye, Proc., EPRI/LRO Fourth Symposium — Vision at Low Light Levels, Orlando Florida (1998)
- (12) The influence of the angular size, adaptation luminance, pulse shape, and light colour on the Blondel-Rey constant a , *The Perception and Application of Flashing Lights*, Adam Hilger London, 95-110 (1971)
- (13)ECE Regulation No. 65 Uniform Provisions Concerning the Approval of Special Worning Lights for Motor Vehicles

4. Other documents received

- (14)Japanese Committee Report: Methods for Photometry of Flashing Light (1988) — in Japanese. (from H. Kondo)

(15)IALA standard: Recommendations on the determination of the luminous intensity of a marine aid-to-navigation light (December 1977) (from Carl Andersen)

5. ASTM Standard Test Method for Measuring the Photometric Performance of Flashing Lights

The document is now being developed by ASTM committee D04.38.04 chaired by J. Rennilson, with several members from TC2-49. Close contact is kept to avoid inconsistency. There was a D04.38 meeting at NIST, Jan. 10, 2000. Fourth draft is now distributed.

6. TC2-49 Partial Draft 0.2 produced to be discussed in London

**Summary of
CIE Division 8 Image Technology**
April 2, 2000

Established in October 1998.

Officers

Director of Division	Todd Newman (USA)
Associate Directors	Mike Pointer (UK) David McDowell(USA)
Secretary of Division	Michael Stokes (USA)
Editor of Division	Mike Pointer (UK)

Terms of Reference

To study procedures and prepare guides and standards for the optical, visual and metrological aspects of the communication, processing, and reproduction of images, using all types of analogue and digital imaging devices, storage media and imaging media.

Div. 8 Technical Committees

- TC8-01: Colour Appearance Modeling for Colour Management Applications (G. Dispoto, USA)
Fall 1998 Report, Gary Dispoto - TC Chair
- TC8-02: Colour Difference Evaluation in Images (M. Stokes, USA)
DRAFT Version 0.3 June, 1999 METHODS TO DERIVE COLOUR DIFFERENCES FOR IMAGES
- TC8-03: Gamut Mapping(J. Morovic, UK)
Progress Report No. 2 1st Half 1999
- TC8-04: Adaptation Under Mixed Illumination Conditions (N. Katoh, Japan)
TC8-04 Meeting (November 16 1999) Minute
- TC8-05: Communication of Colour Information (L. MacDonald, UK)
Will meet in Derby and Scottsdale
- TC8-06: Image Technology Vocabulary (J Schanda) - June 99
TR: To liaise with TC7-06 (International Lighting Vocabulary) and collate definitions of terms associated with image technology.

Div.8 Reporterships

Grading of instruments

will be pursued for establishment by director Newman and Y Ohno on the grading of instruments for imaging technology as requested in the D8 meeting in Baltimore.

R8-02 Reportership on Fluorescence

C McCamy (USA)

TR: To report annually on problems involving fluorescence in image technology, activities in the standards bodies and publications that bear on fluorescence problems, and to recommend the formation of a technical committee if such activity appears desirable.

R8-03 Reportership on potential CIE and IEC/TC100/PT61966 interactions

H Ikeda (Japan)

TR: To produce a report on how CIE Division 8 should interact with IEC TC100 PT61966.